

NON-PUBLIC?: N  
ACCESSION #: 9405120067  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: St. Lucie Unit 1 PAGE: 1 OF 4

DOCKET NUMBER: 05000335

TITLE: Automatic Reactor Trip caused by Control Element Drive  
Mechanism Bus Overcurrent and Undervoltage Transient due  
to Procedural Error  
EVENT DATE: 04/03/94 LER #: 94-004-00 REPORT DATE: 05/03/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 19

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: Edward Lyons, Shift Technical TELEPHONE: (407) 465-3550  
Advisor

COMPONENT FAILURE DESCRIPTION:  
CAUSE: B SYSTEM: EB COMPONENT: BKR MANUFACTURER: W120  
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

#### ABSTRACT:

On April 3, 1994 at 0036 hours with St Lucie Unit 1 in mode 1, the Control Element Drive Mechanism (CEDM) bus was deenergized, which tripped the reactor. The utility licensed operators carried out Emergency Operating Procedure-01, Standard Post Trip Actions. Emergency Operating Procedure-02, Reactor Trip Recovery, was completed confirming an uncomplicated reactor trip. The plant was stabilized in mode 3, Hot Standby.

The cause of the plant trip was an overcurrent condition on the CEDM bus caused by the CEDM Motor Generator (MG) sets being out of phase due to a procedural error. The 1A3-1A2 4.16 KV tie breaker was opened, per a temporary change to an approved plant procedure, to isolate the 1A2 4.16 KV bus for repair of the 1A2 4.16 KV Startup Transformer Breaker. The

running 1A Emergency Diesel Generator (EDG) switched to the isochronous mode when the 1A3 4.16 KV bus was separated from the grid. The electrical frequency of all components supplied by the 1A EDG then became independent from the B train components. The resulting phase mismatch between the A train MG and B train MG sets caused an overcurrent condition on the CEDM bus. Trip Circuit Breakers (TCBs) 4, 8, 9 and the A MG set output breaker opened as designed on instantaneous overcurrent. The root cause of the procedural error was due to personnel focusing on issues other than the potential for phase mismatch between the MG sets during the review of the temporary procedure change.

Corrective actions for this event: 1) Checks were performed on the CEDM system, MG sets, MG set output breakers, and TCBs with satisfactory results, 2) Training will be provided to reviewers of temporary changes to procedures to reinforce the need for prior Facility Review Group review of complex changes to procedures. 3) the affected breaker and associated components were replaced, 4) Onsite breaker cubicles of large frame breakers were inspected with satisfactory results.

END OF ABSTRACT

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#### DESCRIPTION OF THE EVENT

On April 2, 1994 Unit 1 was undergoing a turbine startup. By procedure, the Auxiliary Transformer Breakers (EIIS:EA) are manually closed at 170 MWe and the Startup Transformer Breakers (EIIS:EB) will automatically open. However, at 1230, the 1A2 4.16 KV Startup Transformer Breaker did not automatically open and would not open remotely or locally.

To facilitate racking out the failed closed Startup Breaker a turbine shutdown and deenergization of the 1A2 4.16 KV bus (EIIS:EA) was required. A temporary change to the turbine shutdown procedure was written to facilitate this process. The temporary change specified the unloading of non-vital support equipment on the A electrical train, starting and loading the 1A Emergency Diesel Generator (EDG)(EIIS:EK) to carry the remaining loads and to isolate the 1A3 4.16 KV bus (EIIS:EB) prior to tripping the turbine. The temporary change to the procedure would ensure that the 1A EDG did not start automatically upon tripping the turbine due to a potential undervoltage condition on the 1A3 4.16 KV bus from a Main Generator Lockout signal. The 1A2 4.16 KV bus was deenergized so that work could be performed without the risk of racking out the 1A2 4.16 KV Startup Transformer Breaker under load. This temporary procedure change was reviewed by individuals from Operations, Electrical Maintenance, Technical Staff and FPL Engineering.

The procedure was then performed. At 0036 the 1A3-1A2 4.16 KV tie breaker (EIIS:EB) was manually opened. The 1A Motor Generator (MG)(EIIS:ED) set output breaker and Trip Circuit Breakers (TCBs)(EIIS:AA) 4, 8 and 9 immediately opened on overcurrent. All Control Element Drive Mechanisms (CEDMs)(EIIS:AA) were deenergized and all Control Element Assemblies (CEAs)(EIIS: AA) were fully inserted into the reactor. The main turbine tripped automatically at 19% reactor power after sensing a loss of CEDM bus voltage. The Reactor Protective System (RPS)(EIIS:JC) actuated on a loss of load signal and TCBs 1, 2, 3, 5, 6 and 7 opened.

The utility licensed operators carried out Emergency Operating Procedure-01, Standard Post Trip Actions. Emergency Operating Procedure-02, Reactor Trip Recovery, was completed confirming an uncomplicated reactor trip. The plant was stabilized in mode 3, Hot Standby.

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#### CAUSE OF THE EVENT

The root cause of the plant trip was an overcurrent condition on the CEDM bus caused by the CEDM MG sets being out of phase due to a procedural error. When the 1A3-1A2 4.16 KV tie breaker was opened, the 1A EDG was separated from the off site power grid and appropriately switched to the isochronous mode. The electrical frequency of all components supplied by the 1A EDG became independent from the B train components. The resulting phase mismatch between the A train MG and B train MG sets caused an overcurrent condition on the CEDM bus. As designed, TCBs 4, 8 and 9 opened instantaneously at 125% of their rated current. The A MG set output breaker also opened on instantaneous overcurrent as per design.

The cause of not identifying the potential for a phase mismatch between the A and B MG sets during the temporary procedure change review process was due to the focus during the review of the procedure change. The reviewers focused primarily on the concerns of personnel electrical safety during troubleshooting, repair of the 1A2 4.16 KV Startup Transformer Breaker, and maintaining A train equipment energized. The potential for a phase mismatch between the two CEDM MG sets was not identified.

The cause of the Startup Transformer Breaker failure was most likely due to problems associated with the breaker cubicle. Inspection of the breaker cubicle after a replacement breaker had been installed and operationally tested revealed that the Mechanical Operated Contact (MOC)

operating arm, connected to the open/close indicator of the breaker, was wedged against the side of the channel for operating the MOC switches instead of centered in the channel.

## ANALYSIS OF THE EVENT

This event is reportable under 10CFR 50.73.a.2.iv as "any event or condition that resulted in manual or automatic actuation of any engineered safety feature, including the Reactor Protection System."

The plant response during this event was bounded by section 15.2.9 of the St. Lucie FUSAR, "Loss of Off site Power." The plant response was more conservative than that described in the FUSAR for the following reasons:

- 1) Power was not lost to auxiliary equipment.
- 2) Steam Generator Feedwater Pumps and Reactor Coolant Pumps continued to operate.

All plant safety functions were met and there were no safety system failures. The Auxiliary Feedwater System and the Steam Bypass Control System functioned as required during this event. The plant response during the reactor trip was observed to be normal for the given conditions. Consequently, the health and safety of the public were not affected by this event.

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## CORRECTIVE ACTION

- 1) Maintenance performed checks of the MG sets, MG set output breakers, the TCBs, and the CEDM system to ensure that there was no equipment damage. The results were satisfactory.
- 2) Training will be provided to the reviewers of temporary changes to procedures to reinforce the need for prior Facility Review Group approval of complex changes to plant procedures.
- 3) Electrical Maintenance replaced the affected Startup Transformer Breaker and the 1A2-1A3 Startup Breaker MOC operating arm cubicle mechanism.
- 4) Electrical Maintenance inspected the onsite cubicles of large frame breakers to assure that the operating lever on the breakers were properly engaged in the channel for the MOC switch in the breaker cubicle. All of the MOC operator pins have been verified to be properly engaged in the operator channel.

## ADDITIONAL INFORMATION

### Failed Components:

Westinghouse Breaker  
Model 50DHP350

### Previous Similar Events:

LER 91-335-006 describes an event which also deenergized the CEDM bus on MG set phase mismatch but due to a different root cause.

ATTACHMENT TO 9405120067 PAGE 1 OF 1

P.O. Box 128, Ft. Pierce, FL M54-0128

May 3, 1994

FPL L-94-115  
10 CFR 50.73

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Re: St. Lucie Unit 1  
Docket No. 50-335  
Reportable Event: 94-004  
Date of Event: April 3, 1994  
Automatic Reactor Trip caused by Control Element  
Drive Mechanism Bus Overcurrent and Undervoltage  
Transient due to Procedural Error

The attached Licensee Event Report is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Very truly yours,

D. A. Sager  
Vice President  
St. Lucie Plant

DAS/JWH/kw

Attachment

cc: Stewart D. Ebnetter, Regional Administrator, USNRC Region II  
Senior Resident Inspector, USNRC, St. Lucie Plant

DAS/PSL #1112-94

an FPL Group company

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